the red stars of classes K5 and M are usually less than one fiftieth as bright as the sun. On the average, the stars of each spectral class are seven times as bright as those of the following class. This rule holds true both for the stars relatively near us, whose individual distances can be measured, and for those belonging to clusters whose distances are known.

There exist, however, many stars of great brightness, of all spectral types, which are almost all so remote that their distances can not be accurately measured. From the best available data, these stars appear to be on the average from 100 to 250 times as bright as the sun, without much difference between the different spectral types.

Among the stars redder than the sun, these two groups, of different brightness, are widely separated; but among the whiter stars they run together, and become identical for the whitest stars (class B), which average more than 250 times as bright as the sun.

In the cluster of the Pleiades (whose distance has so far been unknown) all spectral classes from B5 to G are represented, and the relative brightness of the different types follows very closely the law which holds good for the fainter stars already mentioned. If it is assumed that the stars of the Pleiades also follow the same law as regards their actual brightness, the distance of the cluster is found to be such that their light takes 600 years to reach us.

From a study of double stars it is found that the stars of the brighter class do not greatly exceed those of the fainter class in mass, and hence that they are either much less dense, or much brighter per unit of surface, or both. The average density of the stars of classes B and A can be found with the aid of certain stars which eclipse one another, and it follows that these stars give off much more light per square mile of surface than the sun does. It can also be shown that the faint red stars give out much less light per square mile than the sun.

If the same is true of the other kind of red stars (which several lines of argument make very probable) these stars must be of enormous size, but very low density.

An arrangement of all these groups of stars in order of increasing density would begin with the bright red stars of the type of Antares, run up the series of stars of great brightness to those of spectrum B, and then down the series of fainter stars, past those like the sun, to the faintest and reddest stars. It seems probable that this arrangement represents the evolutionary history of a star, which at first becomes heated more and more by its own contraction, and finally, as it becomes too dense to admit of further shrinkage, cools off like a solid body.

At the annual dinner on Saturday evening at the Bellevue-Stratford nearly eighty members and guests were present, the toasts being responded to as follows:

"The Memory of Franklin," by Professor John Bassett Moore.

"Our Sister Societies," by Professor Chas. F. Chandler.

"Our Universities," by Professor Ernest W. Brown.

"The American Philosophical Society," by Professor Francis B. Gummere.

An important feature of this occasion was the presentation of the Henry M. Phillips prize of two thousand dollars to the author of the crowned essay on "The Treaty-making Power of the United States and the Methods of its Enforcement as Affecting the Police Powers of the United States." The successful competitor was Charles H. Burr, Esq., of Philadelphia, the judges of award being Joseph Choate, former ambassador to Great Britain; Judge John C. Gray, of Harvard College; Henry Wade Rogers, dean of the Yale Law School; J. M. Dickinson, former Secretary of War; and Joseph Brown Scott, of the Department of State at Washington.

In their sealed verdict the judges declared that they found great difficulty in deciding the essay of Mr. Burr and that of Edward S. Corwin, of Princeton University.

Arthur Willis Goodspeed

SOCIETIES AND ACADEMIES

THE TENNESSEE ACADEMY OF SCIENCE

On March 9, 1912, a meeting was held in Nashville, Tennessee, to make plans and prepare a constitution for a Tennessee Academy of Science. The meeting was called by Dr. Geo. H. Ashley, then state geologist.

The first general meeting, which was largely attended, was held at the Carnegie Library, Nashville, on April 6, at which time the following officers were elected: C. H. Gordon, president; J. I. D. Hinds, vice-president; Wilbur A. Nelson, secretary, Capitol Annex, Nashville; S. M. Barton, treasurer, and E. S. Reynolds, editor; after which the following papers were read:

"On the Reported Discovery of Radium in Arkansas," A. H. Purdue, former state geologist of Arkansas.

"Neon and Wireless Waves," William L. Dudley, Vanderbilt University.

"Rock Striations and their Causes," Chas. H. Gordon, University of Tennessee.

"Railroad and Road-building in Tennessee before Civil War," Gus Dyer, Vanderbilt University.

"The Beginning of Music," R. M. Ogden, University of Tennessee.

"Food and Drug Inspection in Tennessee," Lucius P. Brown, Tennessee Food and Drug Inspection.

"Review of 'History of Geological Work in Tennessee,'" L. C. Glenn, Vanderbilt University.

"Some Remarkable Phenomena of the Tornado in Montgomery County, Tennessee, April 29, 1909," James A. Lyon, S. P. University.

"Some Effects of Parasitic Fungi on Leaf Tissue," Ernest S. Reynolds, University of Tennessee.

"Photomicrography in Colors by the Lumière Process" (illustrated); "An Apparatus for Washing Fixed Microscopic Material" (illustrated), Samuel M. Bain, University of Tennessee.

"The Selection of Food in Unicellular Animals" (illustrated), Asa A. Schaeffer, University of Tennessee.

"Electrical Conductivity in Dental Fillings," John Daniels, Vanderbilt University.

WILBUR A. NELSON,
Secretary

THE ACADEMY OF SCIENCE OF ST. LOUIS

THE meeting of the academy was held at the academy building on Monday, April 1, 1912, at 8 P.M., President Engler in the chair.

Dr. G. O. James, of Washington University, addressed the academy on "The Application of the Relativity of Gravitation to the Motion of the Perihelion of Mercury."

J. L. Van Ornum, professor of civil engineering at Washington University, reviewed the methods practicably applicable to prevent dampness in rubble masonry foundation walls; that is, by drainage or by an impervious coating of their exterior, or by both. Impermeability may be attained by constructing an impervious diaphragm of a bituminous material; by an efficient surface coating, preferably on the outside; by carefully securing a maximum density by properly proportioning the components of the concrete; or by mixing with the concrete certain colloidal (or other) substances to secure this result. The latter two methods have been experimentally investigated in successive years as thesis work by H. F. McFarland, P. C. Grace, S. Johnson and W. K. Begeman. Their results agree in general with those of others in concluding that, for any usual conditions, the patented mixtures sold for this purpose vary in effectiveness from very poor to very good; and that proper proportioning of the constituents of the concrete to attain a maximum density, such as is desirable to secure a maximum strength, will also effect practical impermeability; but they differ from the conclusions of some others in the fact that they found no advantage to result from the incorporation of such a material as hydrated lime in the richer mixtures.

The apparatus designed by the students for these experiments, which gave pressure up to forty pounds per square inch, was planned to eliminate certain features of the experimental devices of others which seemed objectionable to them; particularly in eliminating tensile stresses from the specimens tested, with the resulting tendency to form cracks.

Professor Nipher gave a preliminary discussion of a phenomenon observed by Planté. It is the buckling of a fine wire through which an electric discharge is passed. Professor Nipher finds that a long and very fine fuse-wire of lead, lying on a strip of glass, usually breaks at the positive end, at a point where it is made fast by sealing wax. The wire at the same time is urged towards the negative terminal, as positive ions are in a gap of air. The metal wire behaves like the positive column in discharge through gases. The negative end of the wire appears to be urged in the opposite direction, as is also the case at the negative terminal in discharge through gases. It sometimes happens that the wire breaks down at the negative end. Nearly all of the wire, however, appears to have the property of the positive column. It is urged longitudinally in a direction opposite to that in which the negative corpuscles are being conducted. Fine copper wire is now being used, and the ends of the wire are left free to move, while the wire is sealed to the glass strip at various intermediate points. The conditions which determine the limiting point between portions of the wire which are being urged in opposite directions have not yet been fully ascertained. The positive ions which constitute the copper wire are not quite as free to "wander" as they are in the case of solutions, or in discharge through gases.

Present indications are that practically all of the fine wire is being urged in a direction opposite to that of the corpuscular flow. There must, however, be an end effect at the negative terminal of the wire which urges the wire in the opposite direction.

AT the meeting of the academy held Monday evening, April 15, 1912, Professor A. S. Langsdorf, of Washington University, addressed the Academy on "Transient Electrical Phenomena," Dr. Chas. H. Turner gave an illustrated account of "Results of Recent Experiments on the Homing of Ants," Dr. Arthur E. Bostwick read a paper on "Atomic Theories of Energy" and Professor Wm. H. Roever, of Washington University, exhibited and explained "A Mechanism for Illustrating Lines of Force."

GEORGE T. MOORE,
Corresponding Secretary

THE TORREY BOTANICAL CLUB

THE meeting of January 31 was held in the Museum Building of the New York Botanical Garden, Vice-president Barnhart presiding. Twenty-five persons were present. The minutes of the meetings of November 29, 1911, and January 9, 1912, were read and approved. Dr. Marshall A. Howe, chairman of the auditing committee, reported that the committee had examined the books of the treasurer and found them to be correct. The report of the budget committee was presented and approved.

The announced scientific program consisted of the reading of papers on "Sir Joseph Dalton Hooker: His Life and Works," by Dr. N. L. Britton and Dr. J. H. Barnhart. Dr. Britton's paper related chiefly to the life of this distinguished botanist, and his publications relating to botany were discussed by Dr. Barnhart. As Sir Joseph Hooker was an honorary member of the Torrey Club, Dr. Barnhart took this occasion to bring before the club the constitutional provisions relating to honorary membership and read the list of all persons who have been elected to honorary membership.

Mr. Fred J. Seaver spoke briefly on the viability of the spores in *Pyronema*. While *Pyronema* has been made the subject of numerous research papers and is figured and treated in most of the recent text-books of general botany, it still remains an unknown plant to most botanists, except to the few who have done critical work with it. There is no reason for it being so, for the fungus is fairly common and is easily grown, as has already been shown in previously published papers. In a recent experiment the speaker was able to show that the spores of this fungus which had been kept nearly three years in the herbarium germinated readily in hanging-drop culture. This last point should be of general interest to teachers of botany, since it means that the plant can be grown and studied from living material and the old plants then placed in an envelope and kept until the next year, when they can be planted and grown again. No complicated technique is necessary for the growing of *Pyronema*. A pot of garden soil should be heated. Heating can be carried on in an autoclave or sterilizing oven. If these are not to be had bake in an ordinary oven. Saturate the soil with tap water after heating and plant the spores. Growth of mycelium should be abundant in two or three days, sex organs should appear in about a week, and mature ascocarps a few days later. A more detailed account of this subject will appear in the *Bulletin* of the club.

Dr. Marshall A. Howe spoke briefly on "Some Marine Algæ from the Stomach of a Peruvian Green Turtle" and exhibited specimens from the source indicated, collected in Peru by Dr. Robert E. Coker. The fragments were in a good state of preservation and two of the species concerned are readily determinable, the most abundant being *Rhodyminia flabellifolia*, a common Peruvian and Chilean species and a close relative of the edible "dulse." The alga coming next in point of abundance is *Caulerpa flagelliform lingulata*, a species occurring elsewhere in Dr. Coker's Peruvian collections, but not before reported from the shores of the American continent. Fragments of a species of *Gelidium* not so certainly determinable also occur.

Dr. W. A. Murrill gave a short account of the progress of his studies on the Agaricaceæ of tropical North America and also read some mycological notes relating to the Washington meeting.

THE meeting of February 13 was held at the American Museum of Natural History at 8:15 P.M. Twenty-three persons were present.

The announced scientific program consisted of a lecture on "Some Botanical Features of a Desert Mountain Range," by Dr. Forrest Shreve. The lecture was illustrated with lantern slides.

B. O. DODGE,
Secretary